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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/414,520	10/08/1999	KAZUE TAKAHASHI	503.37698X00	3400
20457	7590	06/02/2005	EXAMINER	
ANTONELLI, TERRY, STOUT & KRAUS, LLP 1300 NORTH SEVENTEENTH STREET SUITE 1800 ARLINGTON, VA 22209-3873			ZERVIGON, RUDY	
			ART UNIT	PAPER NUMBER
			1763	

DATE MAILED: 06/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s)	
	09/414,520		TAKAHASHI ET AL.	
	Examiner		Art Unit	
	Rudy Zervigon		1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 February 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 6,7 and 9-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 6,7 and 9-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>2/28/2005</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 15 and 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
3. Claims 15 and 16 recite the limitation "said electrodes". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
5. Claims 6, and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Satou et al (U. S. Pat. 5,961,850) in view of Tokunaga, Takafumi et al (US 5,874,013 A). Satou et al teaches:
 - i. a plasma ECR processing apparatus (Figure 1, column 2, lines 32-58) having a vacuum processing chamber (Figure 1, item 10, column 3, lines 10-15)
 - ii. a sample table (Figure 1, item 11, column 2, lines 32-58) for mounting the sample (Figure 1, item 13, column 2, lines 32-58) which is processed in the vacuum processing chamber

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- iii. a plasma generation means (Figure 1, column 2, lines 45-52), wherein a plasma etching (column 2, lines 59-67; column 4, lines 32-36) of an semiconductor device (column 2, lines 39-41) is carried out by generating a plasma in response to introduction of a gas (column 2, lines 59-62) which generates a plasma
- iv. A temperature of a region (items 36, 37; column 2, lines 52-58) which forms a side wall of the vacuum processing chamber is controlled be in a range of 10°C to 120°C (column 3, lines 10-21)
- v. A plasma processing (column 2, lines 59-67) apparatus wherein as a means for adjusting a temperature of the vacuum wall, a temperature adjusted coolant (column 3, lines 22-23) medium is used.
- vi. A temperature controllers (I34 and II35; Figure 1) whose "temperature control accuracy" is $\pm 5^{\circ}$ - Satou temperature set point achieves the "desired temperature" according to Satou (column 2; lines 52-58) and thus achieves a "temperature control accuracy" is $\pm 0^{\circ}$ that is within the claimed range

Satou et al does not teach:

- vii. A microwave frequency in the 300MHz to 1GHz range
- viii. plasma generation means which generates a plasma in which the degree of plasma dissociation is a middle degree and the gas species containing carbon and fluorine is generated fully in the plasma
- ix. an oxide surface as Sauto's semiconductor device (column 2, lines 39-41)

Tokunaga teaches a plasma etching ECR method (Figure 1, column 7, lines 55-65) including:

- x. A microwave frequency in the 300MHz to 1GHz range (column 1; lines 30-35)

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- xi. plasma generation means which generates a plasma in which the degree of plasma dissociation is a middle degree – column 5, lines 5-36
- xii. carbon and fluorine plasma species - column 5, lines 5-36
- xiii. an oxide surface to be etched (7; column 8; lines 38-44)

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Satou to use Tokunaga's plasma ECR etching method of microwave frequency range and selective plasma dissociation of carbon and fluorine species as taught by Tokunaga to etch Tokunaga's oxide surface.

Motivation for Satou to use Tokunaga's plasma ECR etching method of microwave frequency range and selective plasma dissociation of carbon and fluorine species as taught by Tokunaga to etch Tokunaga's oxide surface is to for performing standard plasma etching of semiconductor wafers under "selective" plasma conditions as taught by Tokunaga (column 1, lines 7-35; column 5, lines 5-42).

6. Claim 7, 9, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Satou et al (U. S. Pat. 5,961,850) and Tokunaga, Takafumi et al (US 5,874,013 A) in view of Ohtake, Hiroto et al (US 6,054,063 A). Satou and Tokunaga are discussed above. Satou further teaches his plasma processing (column 2, lines 59-67) apparatus wherein as a means for adjusting a temperature of the vacuum wall, a temperature adjusted coolant (column 3, lines 22-23) medium is used.

Satou and Tokunaga do not teach plasma electron energies in the range of 0.25eV and 1eV. Satou and Tokunaga do not teach intermittent microwave application.

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Ohtake teaches a plasma etching method (Figure 1; column 2, lines 35-64; column 4; lines 55-67) including pulsed microwave application for maintaining electron temperatures ("energies") below 2eV (column 5; lines 6-14; claim 4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Satou and Tokunaga to use Ohtake's intermittent microwave application method for maintaining an etching method with electron energies below 2eV.

Motivation for Satou and Tokunaga to use Ohtake's intermittent microwave application method for maintaining an etching method with electron energies below 2eV is for effecting high-speed etching (column 3, line 64 – column 4, line 3) and controlling negative ion density (column 5; lines 6-14).

Response to Arguments

7. Applicant's arguments with respect to claims 11-16 have been considered but are moot in view of the new grounds of rejection.

Conclusion

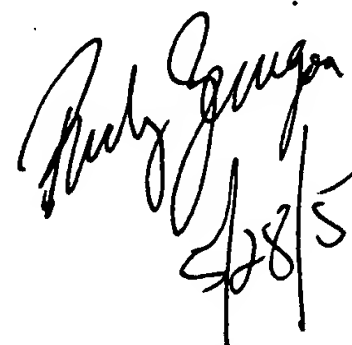
8. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

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will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272.1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1763 art unit is (703) 872-9306. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.



Rudy Zervigon
4/28/5